

# **LOGISTICS CHAIN ANALYSIS OF ALEXANDRIA CONTAINER HANDLING COMPANY IN EGYPT: A BASIS FOR ASSESSING AND IMPROVING SERVICES**

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## **1. INTRODUCTION**

Worldwide orientation towards globalization and free trade has created strong competition among international ports and container terminals. These are striving to enhance their market competitiveness, through introducing efficiency improvements, new and better quality services as well as by developing their management styles. Several Mediterranean ports are currently competing to become hub points, attracting container movement, particularly transit containers, across the continents of Africa, Asia and Europe. Two main keys to such competition are availability of sufficient capacities for handling containers as well as types, levels of services and costs offered in these ports. Ingredients for evolution of regional container ports were discussed by Wang & Slack (2000) as well as by O'Mahony (1998).

Egypt is a country uniquely located at the crossroads of the three continents with a 2000 km. of coastal frontiers. Its north border is located on the Mediterranean Sea, where one of the oldest ports in the world, namely the port of Alexandria, is in operation. Its east border is located on the Red Sea with a number of new ports such as Suez, and Safagga currently operating. The Egyptian government policy aims at promoting exports as well as attracting a greater share of regional and international markets for container handling, transient and transshipment. The efficient and effective movement of cargo and containers through Egyptian ports can be considered as a detrimental factor towards the success of this policy.

Alexandria Container Handling Company (ACHC) is the oldest container handling company in Egypt. Its business involves handling and storage of imported, exported and transit containers. This research aims at developing two logistics chains that simulate the activities performed by Alexandria Container Handling Company (ACHC). The first is the chain describing the process involved in handling imported containers and the second is the chain concerned with handling exported containers. These chains include activities such as loading, unloading of containers, internal transport to container storage yards, handling of containers, customs procedures, other inspections and quality control, and finally loading of containers to customers' vehicles. The research presents an assessment of the quality of services provided by ACHC. This is based on examining performance indicators, scrutinising developed logistics chains as well as conducting an analysis of 45 service assessment questionnaires

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completed by ACHC customers. A diagnostic identification of strengths and weaknesses of ACHC then follows. The paper concludes with proposing a number of potential measures, considerations and policies aimed at producing improvements to the operation of the current logistics chains for the company, in particular, as well as for other container handling companies.

## 2. ALEXANDRIA PORT: ROLE AND SHARE

To demonstrate the importance of Alexandria port, figure 1 shows the number of ships arriving to and departing from the five main Egyptian ports in 2001. It is obvious from the figure that 42% of all ships have anchored into Alexandria port followed by 23% in Port Said Port and 20% in Damietta port. In figure 2, the amount of cargo handled through four of the five ports is also shown (data was not available for Port Said Port). However, the figure is suffice to show the dominance of Alexandria port with a total of 32054 thousand tons of cargo being handled at the port during 2001.

In 1984, Alexandria port was the first port in Egypt to offer container-handling services through ACHC. However, as time went on, the Egyptian government realised the capacity and technological limitations of Alexandria port in terms of container handling. Port facilities required for container handling were discussed by Cheng and Wong (1997). Towards the end of the 1980s, two new container-handling terminals were constructed in Damietta and Port Said ports. These two ports attracted a significant number of containers, see figure 3. The figure shows that among the four main ports in Egypt, Alexandria port is currently the third with a percentage share of about 30.6% of standard container (TEU) handling activities. This could be attributed to high transit container handling activity at Damietta and Port Said ports, respectively sharing 33.7% and 32.1%. With regards to handling TEU cargo, figure 4 shows that Alexandria port is currently the second of the four main ports with a percentage share of about 30.8%.

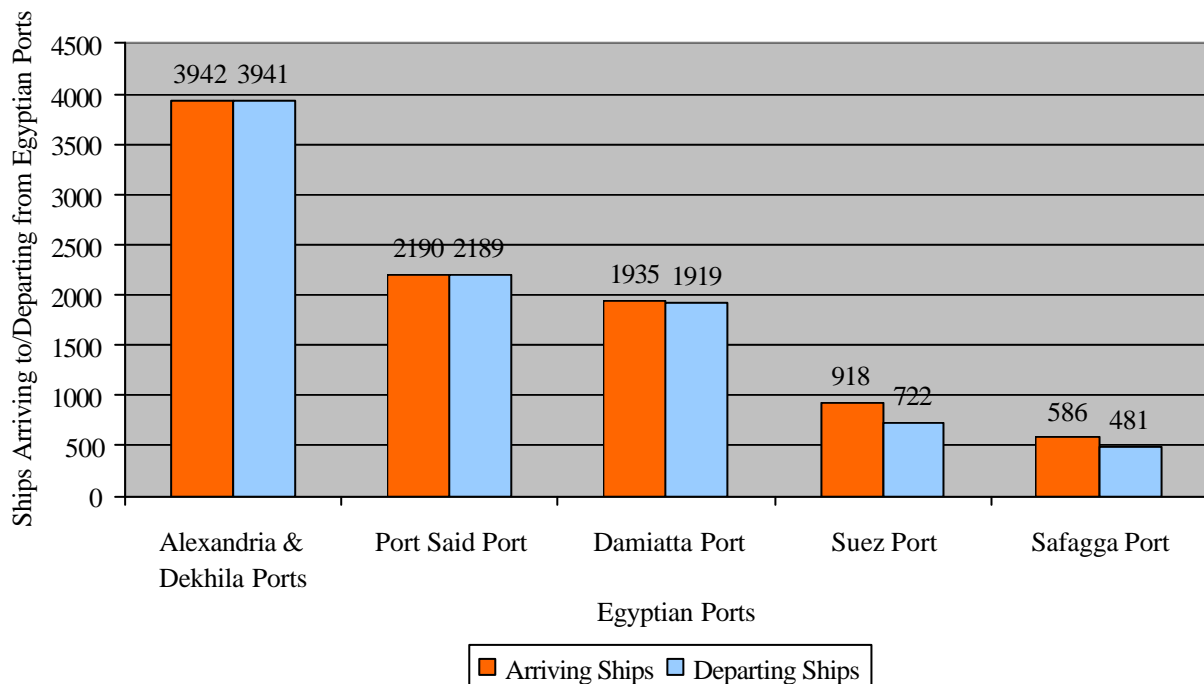


Figure 1: Number of Ships Arriving to/Departing from Main Egyptian Ports in 2001 (Source: MRCC, 2002a)

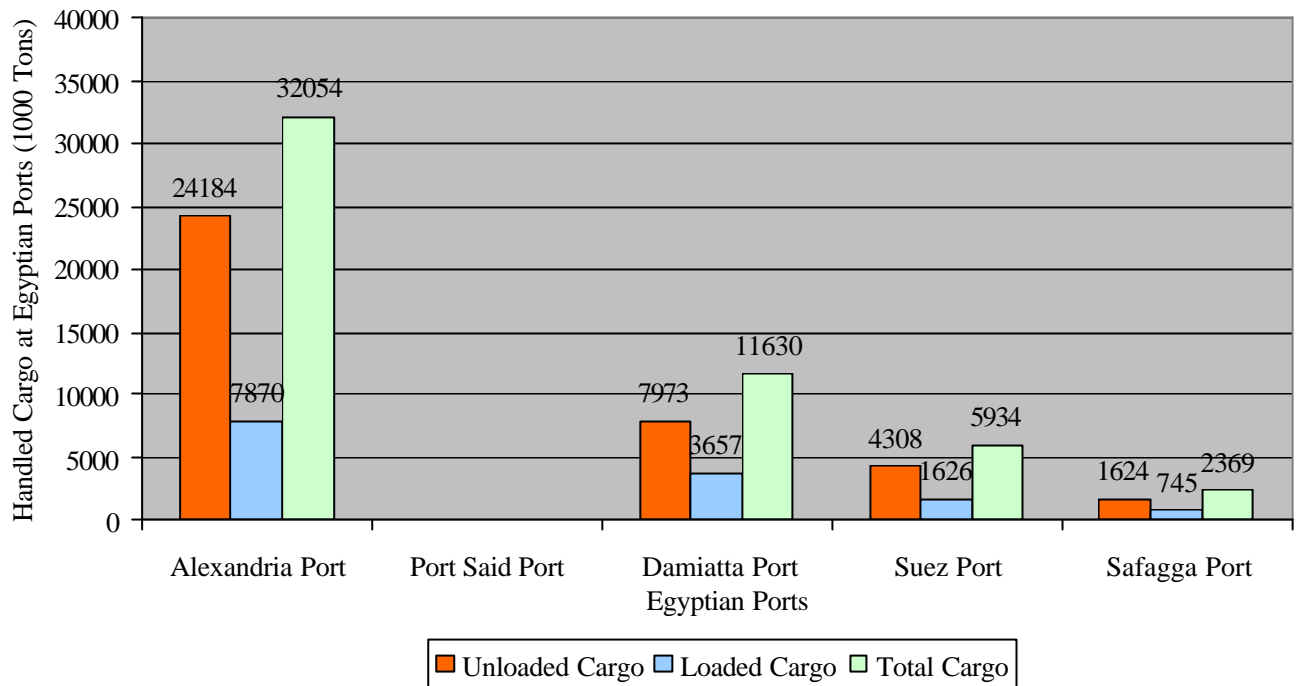


Figure 2: Cargo Handled by Main Egyptian Ports in 2001 (Source: MRCC, 2002a)

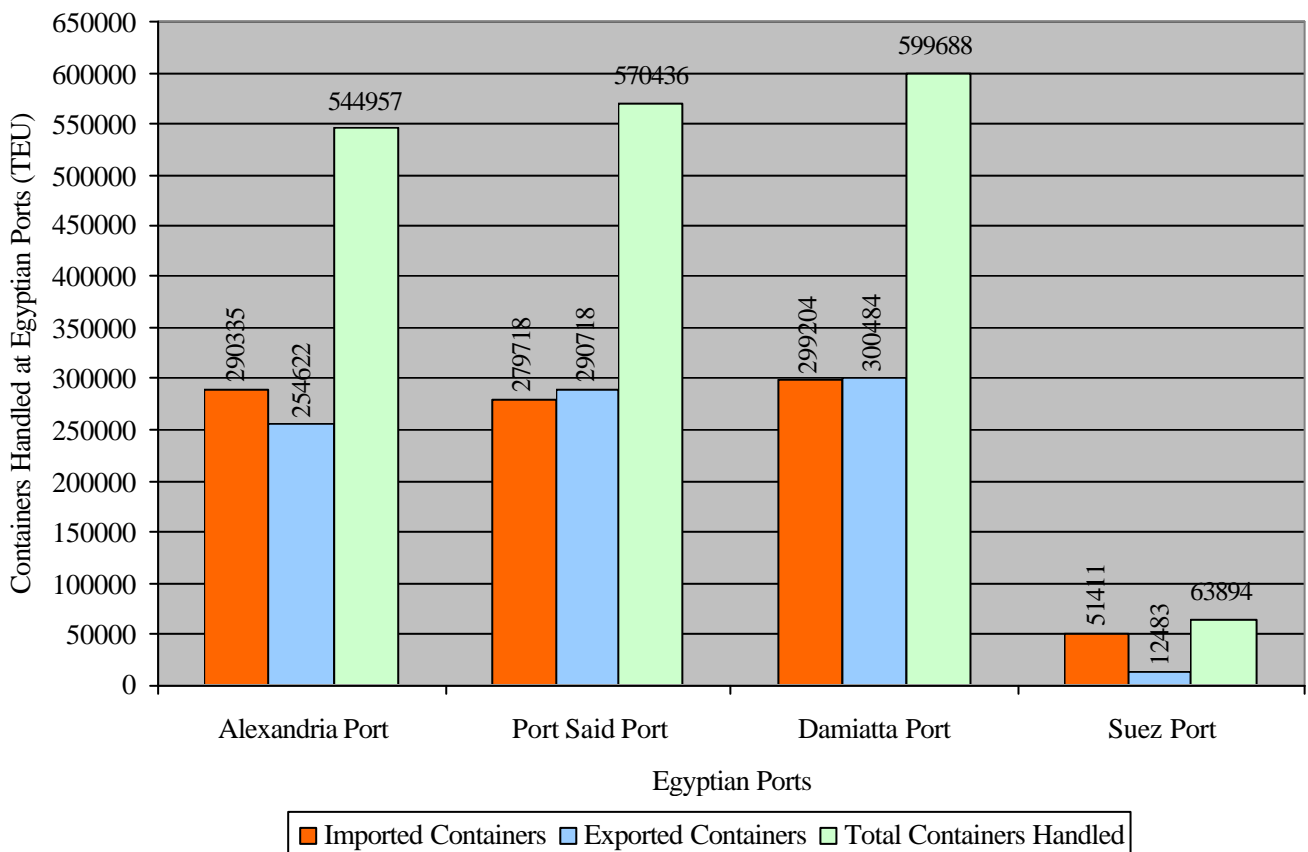


Figure 3: Standard Containers (TEU) Handled by Main Egyptian Ports in 2001 (Source: MRCC, 2002a)

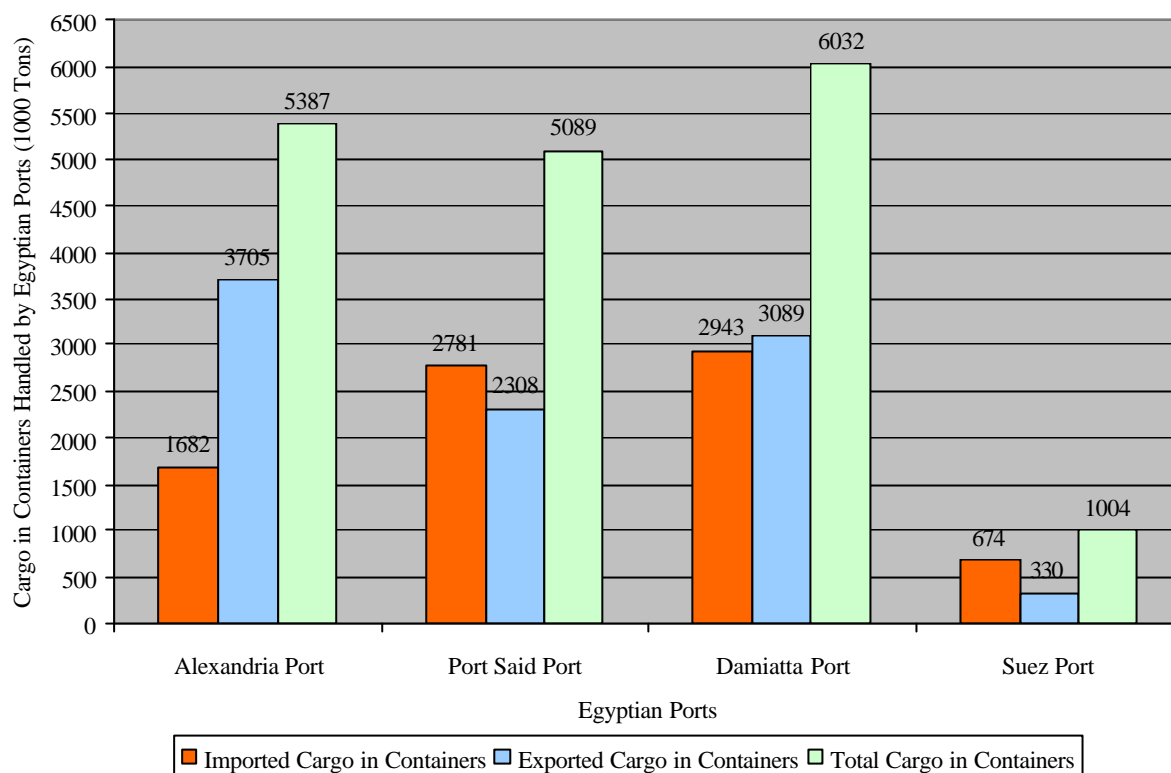


Figure 4: Cargo in TEUs Handled by Egyptian Ports in 2001 (Source: MRCC, 2002a)

### 3. ACHC: ACTIVITY AND PERFORMANCE

As stated earlier, ACHC started its operation in 1984 as the first container handling company in Egypt. The company terminal is located in the middle of Alexandria port spreading over an area of 163000 m<sup>2</sup>. The terminal quay allows the anchoring of 4 ships at one time. It is designed to handle 160000 TEU per year. The storage capacity is 11000 TEU. Over the years, the company has already exceeded its designed capacity in terms of container handling, see figure 5. The figure demonstrates that during the year 90/91 the company reached its capacity and currently is operating to serve a demand, which is almost 4 to 5 times its designed capacity. The company is striving to maintain its competitive position in Egypt and throughout the Middle East region. Recently, in 1996 the company established a new container terminal in El Dekhila port, which is in the vicinity of Alexandria port. El Dekhila terminal area is around 380000 m<sup>2</sup>, while its storage capacity is 15000 TEU.

Despite of this expansion, Alexandria handling company is relatively lagging in its performance in comparison to the two other main container handling companies, namely Port Said and Damietta container handling companies, see table 1. The table demonstrates that for the year 2001, the average time being consumed by ACHC in the loading/unloading of containers to/from a ship is about 14 hours and 30 minutes. This is a longer time in comparison to the performance of the other two companies. Also the idle time, where ships are anchored and no operation by ACHC is being conducted is relatively long, i.e. on average 2 hours and 12 minutes per ship. This affects the output of the company measured in terms of TEU handled per hour, which reached 29 TEU/hour for ACHC, This is less than the performance of Port Said and Damietta container handling companies, that reached, in 2001, 35 TEU/hour and 62 TEU/hour respectively.

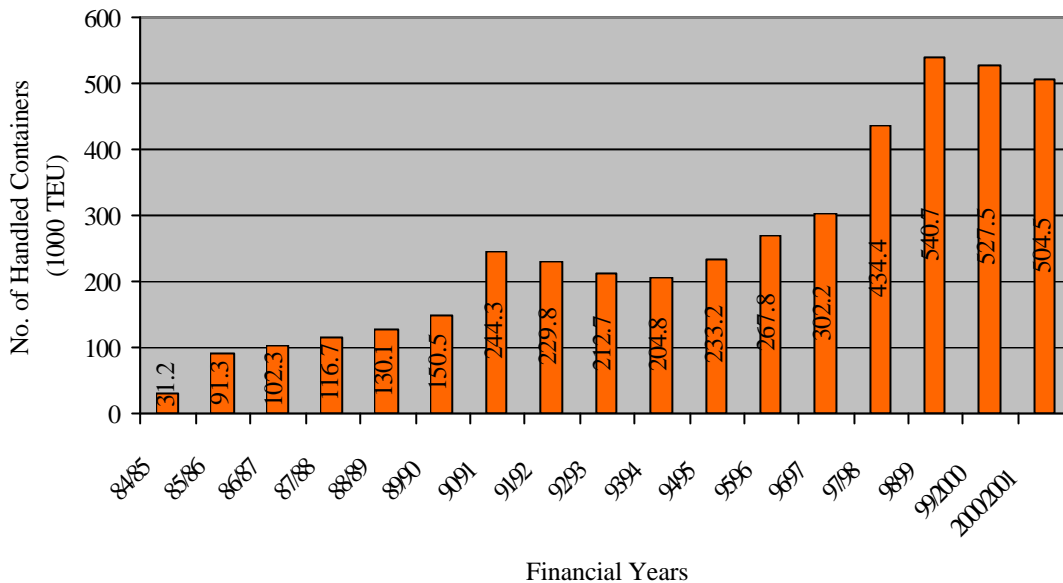


Figure 5: Number of TEUs Handled by ACHC (Source: ACHC, 2002)

Table 1: Performance Indicators for Container Handling Companies in Egypt Based on 2001 Annual Statistics (Source, MRCC, 2002b)

	Ships	TEU	Operation Time (Hrs.)	Idle Time (Hrs.)	Total Time (Hrs.)	Total Time/ Ship	Idle Time/ Ship	Rate of Handled TEU
Alexandria Container Company	1435	504550	17630	3150	20780	14 hrs. & 30 min.	2 hrs. & 12 min.	29/hour
Port Said Container Company	1439	553426	15867	422	16289	11 hrs. & 37 min.	18 min.	35/hour
Damiatta Container Company	1161	615799	9974	1770	11744	10 hrs. & 7 min.	1 hrs. & 31 min.	62/hour

#### 4. LOGISTICS CHAIN ANALYSIS FOR ACHC

According to Whiteing (2001), it is often claimed that the essential principles of logistics and supply chain management can be applied to many different business processes across a wide range of industries, including service industries. This is meant to assist in simulating business activities in a transparent and insightful fashion. In this section, the business of container handling service in Egypt, represented by ACHC, is subjected to analysis based on the principles and generic components of logistics chains. In this context, two logistics chains that simulate the activities performed by ACHC were developed.

##### 4.1. Logistics Chain for Handling Imported Containers by ACHC

The first chain is concerned with describing the process involved in handling imported containers by ACHC, see figure 6. Seven main stages can be identified, namely:

- ) Ships anchoring at berths.
- ) Unloading and loading of containers into tractors/trailers.
- ) Moving containers within premises.
- ) Unloading, storing, and handling containers as well as conducting customs, agriculture, radiation, and other inspections and obtaining necessary clearances.
- ) Loading and moving inspected containers within premises.

- ) Unloading, handling and stripping cargo from containers.
- ) Loading and transporting containers/or cargo to customers' warehouses.

The first three stages can be grouped under the inbound logistics component of the chain. The fourth stage is the core of the process where imported and transit containers are stored and handled while stages five and six represent the outbound logistics component of the chain. The process starts by a navigation line agent informing the company with the expected time for the arrival of a ship carrying imported and/or transit containers. The agent also contacts the port authority requesting permission for the ship to enter the port and anchor into ACHC berths. Once ships are anchored, the first container handling activity starts in terms of operation of gantry cranes to unload containers from the ship deck and load it into the terminal quay. This is followed by the operation of forklift trucks to load containers from the quay and into the deck of trailers and/or tractors. Such fleet could be either owned by the company, by customers or by an agent in case of special dimension containers. Containers may be transported directly, without undergoing any customs or inspection controls, to the customers' warehouse. Such cases include containers containing army imports, environmentally polluting cargo, fragile cargo, and cargo that can be subjected to customs control through customs control offices located within customers' premises such as the case with imported tobacco.

In most cases, imported containers are moved within the company premises to be stored in accordance with their content either in the yards for containers containing refrigerated cargo or in the yards for containers carrying dangerous cargo or in the yards for containers containing imported general cargo. Transit and special dimension containers are moved to yards specially allocated for these purposes. Containers that contain shared cargo are moved to a special depot for unloading shared cargo. Once containers reach their storing yard, handling equipment such as transtainers, telescopic stackers or forklift trucks are used to stack them to their exact locations. Information for each stacked container is then recorded into a computer database. Typically, such information would include, the name of the navigation line, name of ship, time of arrival, container number, storage location, content, etc.

At this stage, several procedures and checks that are outside the scope of activities conducted by the company take place. These include customs inspection, due estimation and clearance, agriculture and radiation inspections, quality controls and expiry checks as well as checking compliance with technical standards. These are conducted by the official responsible bodies and facilitated by the company in the presence of customers or their brokers.

Once such inspection procedures are completed, and all requested permissions are cleared, containers can be released and loaded into tractors/trailers owned or rented by customers and transported to customers' warehouses. Alternatively, containers are loaded into tractors/trailers owned by the company and moved within the company's premises to a depot allocated specially for stripping containers. Cargo is then stripped from containers and loaded into customers' owned/rented heavy or light goods vehicles (HGV & LGV) and transported to customers' warehouses. Empty containers are loaded into tractors/trailers and moved to a yard specially allocated for storing empty containers. From this yard, empty containers, on request, can be released for local exporters. These are loaded into trailers/tractors and transported to the location of local exporters.

## 4.2. Logistics Chain for Handling Exported Containers by ACHC

The second main chain is concerned with handling exported containers by ACHC, see figure 7. As shown in the figure, also seven stages can be identified, namely:

- ) Loading and transporting containers/or cargo from customers' warehouses.
- ) Unloading, handling and stuffing cargo into containers.
- ) Loading and moving containers within premises.
- ) Unloading, storing, handling, customs, agriculture, radiation, and other inspections and clearances.
- ) Moving inspected containers within premises.
- ) Unloading and loading containers into ships.
- ) Ships departing from berths.

Stages (b) and (c) can be grouped under inbound logistics component of the chain. The fourth stage is the core of the process where exported containers are stored and handled while stages five and six represent the outbound logistics component of the chain. The process starts at customers' premises, where empty containers and containers containing exported cargo are loaded into tractors/trailers owned and/or rented by customers. Loaded containers are transported to yards, allocated for storing exported containers, within company's premises. Empty containers are transported to yard allocated for storing empty containers. These are moved using company owned tractors/trailers to the depot allocated for stuffing containers within Alexandria port.

Alternatively, separate cargo are loaded into HGV and/or LGV owned or rented by customers and transported from customers' warehouses to the container-stuffing depot. In this depot cargo are handled and stuffed into allocated containers. Containers stuffed with exported cargo are then loaded into company owned/rented tractors/trailers and moved to export yards. In the case of refrigerated cargo or refrigerator containers, these are directly transported from customers' premises using owned and/or rented trailers or HGV, to the yards within the company allocated for stuffing and storing refrigerator containers. Lastly, special dimension containers are loaded into agent owned tractors/trailers and transported from customers' premises to the yard allocated for special dimension containers.

Once containers reach their storing yards, handling equipment such as transtainers, telescopic stackers or forklift trucks are used to stack containers to their exact locations. At this stage, several procedures and checks that are outside the scope of activities conducted by the company take place. These include customs inspection, due estimation and clearance, agriculture and radiation inspections, quality controls and expiry checks as well as checking compliance with technical standards.

Once such inspection procedures are completed, company owned trailers/tractors are loaded with exported and/or transit containers which are identified by the navigation line agent as the ones designated for shipping. These are then moved within the company's premises to the terminal quay, where ships are anchored. Forklift trucks are operated to unload containers from the decks of tractors/trailers and into the quay ground. Gantry cranes are then used to lift containers to the decks of ships anchored at terminal berths.

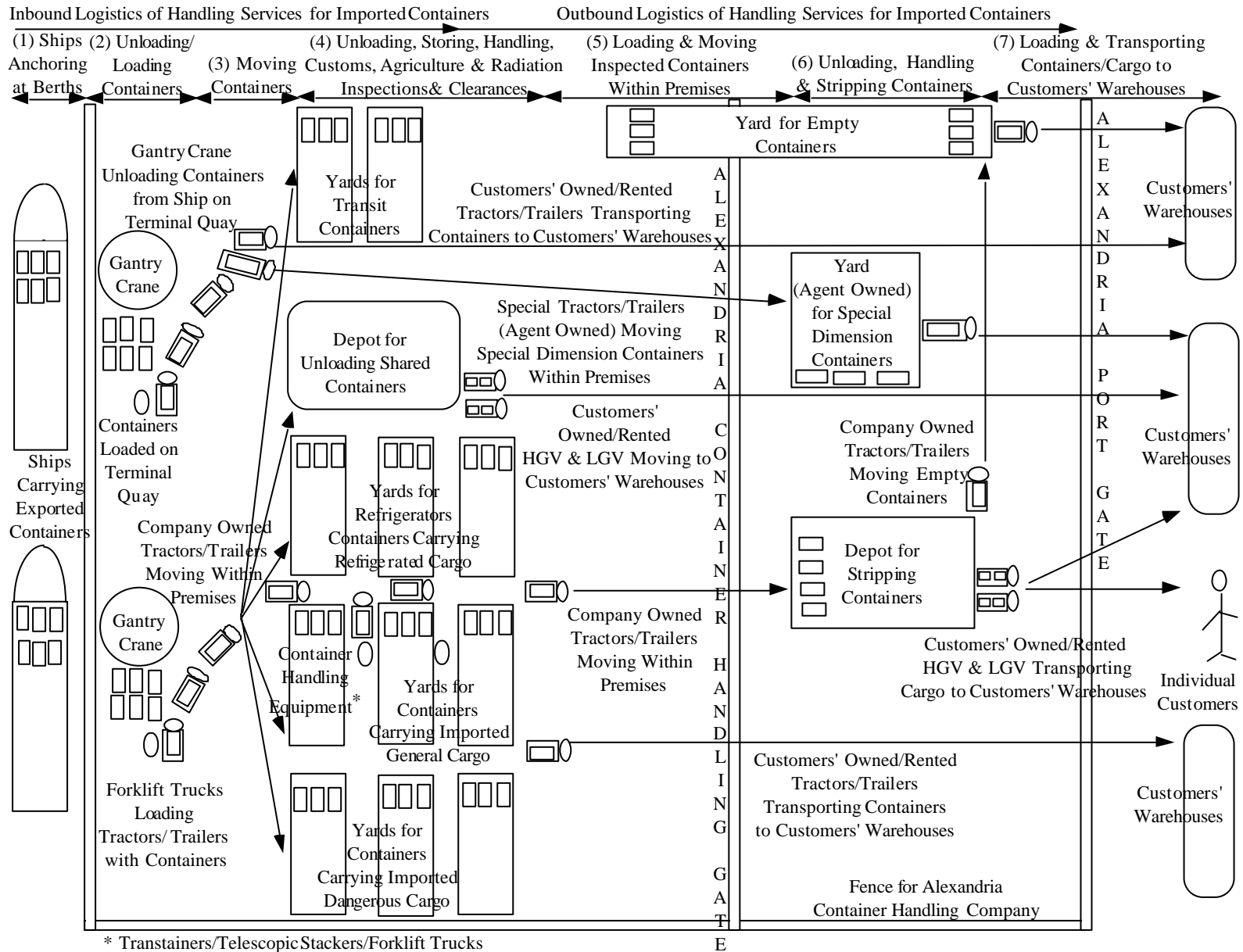


Figure 6: Logistics Chain for Handling Imported Containers by Alexandria Container Handling Company



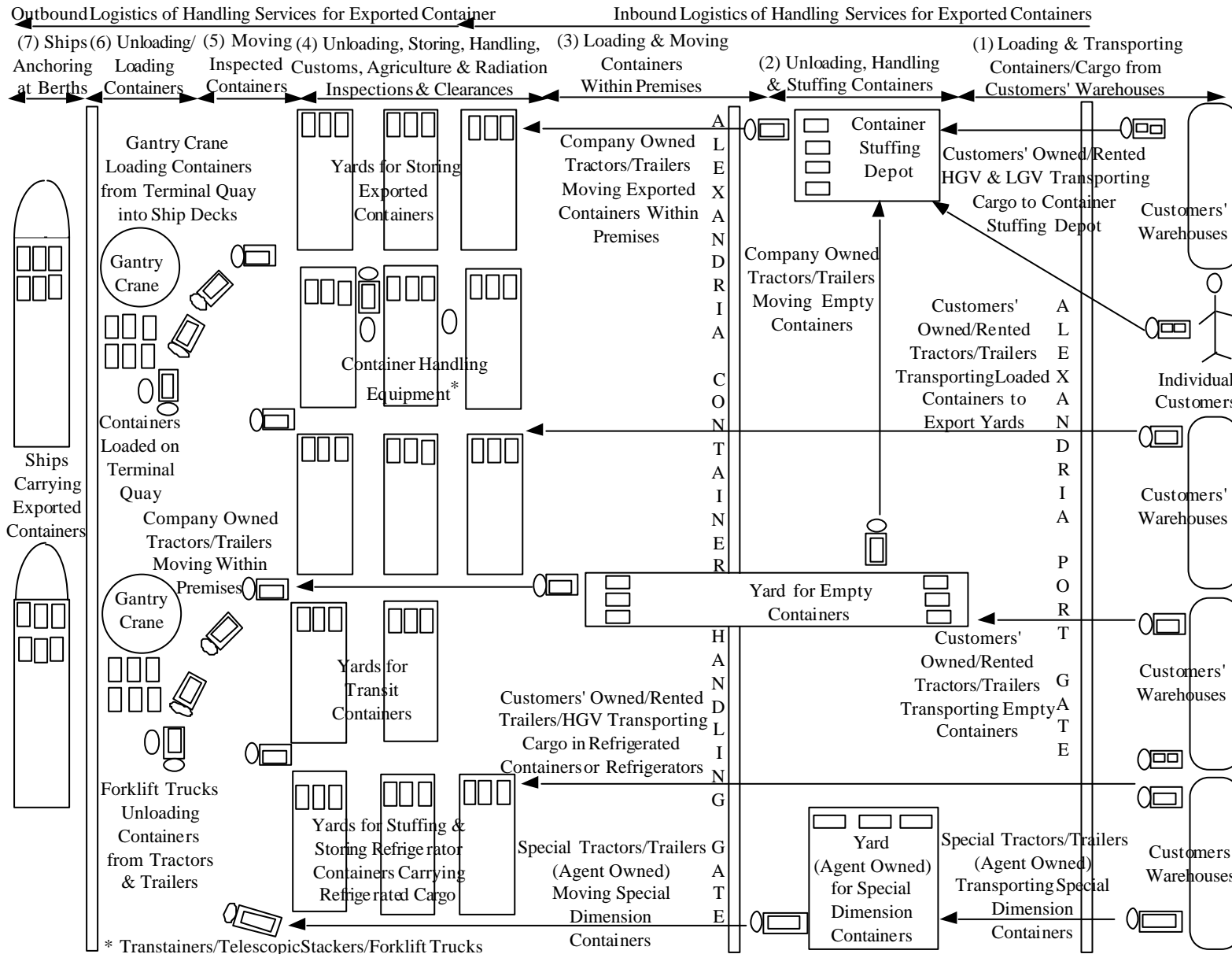


Figure 7: Logistics Chain for Handling Exported Containers by Alexandria Container Handling Company

## 5. ASSESSING SERVICES OFFERED BY ACHC USING A CUSTOMERS' QUESTIONNAIRE

Based on examining the previous logistics chains, it became obvious that there are at least six main stakeholders involved in the business of container handling, see figure 8. The relationship between these stakeholders is extremely complex. Such relationships can either create favourable working conditions or can substantially limit the efficiency and effectiveness of the whole container handling process.

The figure shows that there are two main types of customers dealing with ACHC. The first are navigation lines and their agents where each navigation line represents a number of exporters and importers. The second are customers inside Egypt, who are directly dealing with the company, or who deal with the company through a broker. In this research, a structured questionnaire was specifically designed to elicit the assessment of customers dealing directly with ACHC with regard to the services offered by the company. The questionnaire contains questions on customers' perception to durations of main activities, as well as choice type questions, see Mokhtar (1999) for questionnaire details. Such questions were designed to allow respondents to assess the services offered by the company by selecting a judgement out of a five-point ordinal scaling system, namely poor, acceptable, good, very good and excellent.

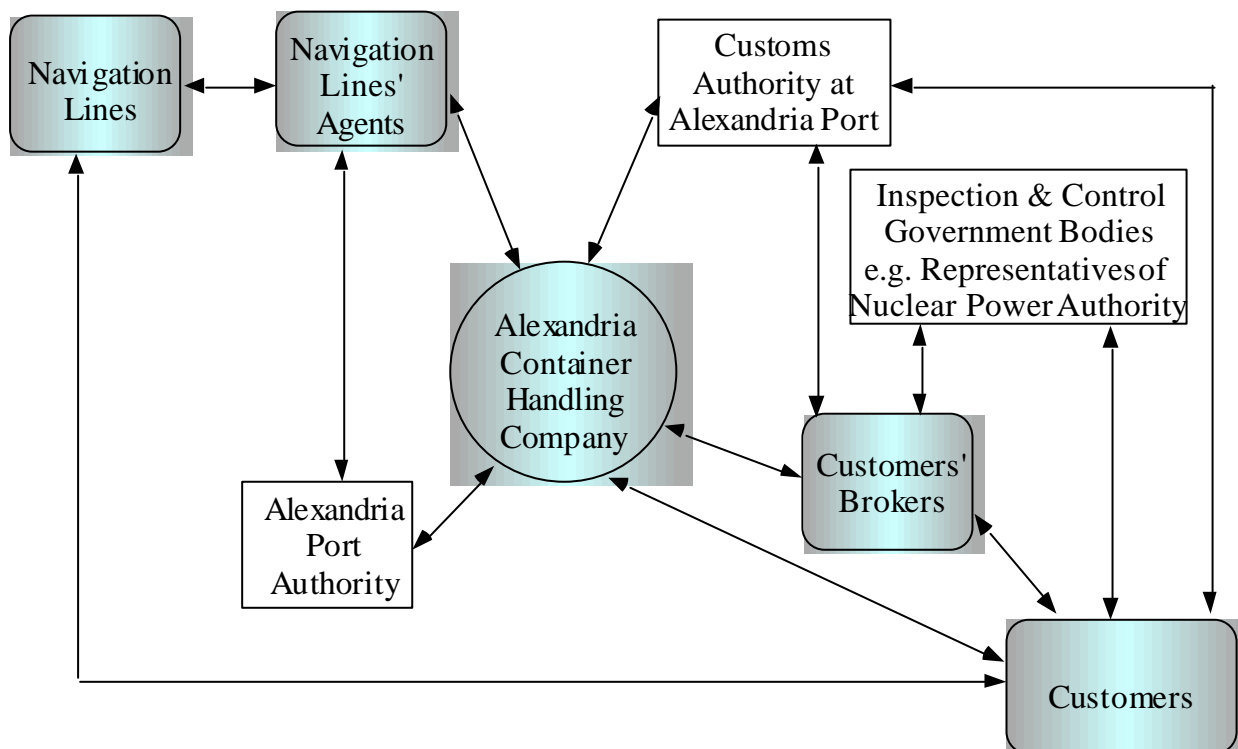


Figure 8: Stakeholders Involved in the Business of Container Handling in Egypt

The questionnaire was distributed and completed by the two types of customers. The population size of customers' brokers dealing with ACHC could not be identified. Questionnaire forms were distributed to 100 brokers. A total of 35 completed questionnaires were returned. As for navigation lines, 20 navigation lines' agents are currently dealing with ACHC. Agents of 10 of these lines completed the questionnaire, thus respondents reached 45. Such number is reasonable, as the threshold, according

to the rule of thumb, for an acceptable sample size allowing manipulation and statistical inference of continuous data ought to be >30, see Richardson et al. (1995). Obviously for nominal data such a number could be even less stringent.

Respondents representing the 10 navigation lines were first asked to state their experiences with regard to the average duration from the time a ship arrives at Alexandria Port to the time the ship anchors at one of ACHC berths. The stated duration for this activity, averaged across the 10 respondents, was 2 hours. Respondents were also asked to state their experiences with regard to the average duration from the time Alexandria Port Authority is notified with the request for a ship to depart to time when the ship actually departs Alexandria Port. The stated duration for this activity, averaged across the 10 respondents, was 1 hour. This shows the efficiency of Alexandria port in dealing with regulations, and granting necessary permissions within a short period of time.

All respondents were then asked to state their experiences with regard to the average duration from the time a customer is notified with the arrival of his container at Alexandria Port to the time the container is released to be delivered to the customer's warehouse. The stated duration for this activity, averaged across the 45 respondents, was 10 days. This is a relatively long time. The length of this time could be either attributed to inefficiency of ACHC or alternatively to the lengthy customs, inspection and quality control procedures. Hence, the questionnaire went further into asking respondents to state, based on their experiences, the time duration for completing customs procedures and obtaining necessary clearance for imported and exported containers containing different cargo. Details of responses are shown in table 2, where it became obvious that containers containing imported machines, equipment and food products consume a lengthy time (4 days) for customs procedures to be completed. Durations stated in table 2 fall in line with average durations stated in a recent study, see AOMD (1999). The table also shows that containers containing imported dangerous materials such as explosives consume a relatively short time (1 day) for customs procedures to be completed. The table also assists in showing the negligible exporting activities of Egypt in terms of machines, equipment and dangerous materials, as most of the respondents stated their limited experiences with such exported cargo through Alexandria Port.

Table 2: Respondents' Perception of Average Duration Per Container to Obtain Customs Clearance \*

Container Content	Imported	Exported
Machines, Equipment, etc	4 Days	Limited Exporting Activities
Food Products	4 Days	2 Days
Dangerous Materials	1 Day	Limited Exporting Activities
Miscellaneous	3 Days	3 Days

(\*) Such duration includes customs procedures, estimation of customs dues, and obtaining necessary clearances

The questionnaire went on to ask respondents to state, based on their experiences, the time duration for completing inspection procedures, including agriculture, radiation, compliance with technical standards, quality controls and expiry checks for imported and exported containers containing different cargo. Details of responses are shown in table 3, where it became obvious that containers containing imported food products consume a lengthy time (8 days) for inspection procedures to be completed. The table

also shows that containers containing imported dangerous materials such as explosives consume a relatively short time (1 day) for inspection procedures to be completed.

Table 3: Respondents' Perception of Average Duration Per Container for Conducting Other Inspections \*

Container Content	Imported	Exported
Machines, Equipment, etc	5 Days	Limited Exporting Activities
Food Products	8 Days	3 Days
Dangerous Goods	1 Day	Limited Exporting Activities
Miscellaneous	4 Days	5 Days

(\*) Inspections include agriculture, radiation, compliance with technical standards, quality controls and expiry checks

In addition, respondents were asked to state their experiences with regard to the rate of container handling from an anchored ship into ACHC quay. The stated rate for this activity, averaged across the 45 respondents, was 20 containers/hours. This is very near to the published rate being 29 TEU/hour.

The choice type questions were mainly concerned with eliciting the assessment of respondents with regard to criteria describing the level of service offered by Alexandria container handling company. In this respect, the questionnaire was guided by the developed logistics chains, which allowed thoughtful consideration of the processes involved in such business. As shown in table 4, six criteria describing level of service were assessed. The company was assessed as being excellent in terms of safety of handling containers. In addition the company was assessed as being very good in terms of punctuality of services offered as well as in terms of ease of dealing with the company. However, the company was rated as just good in terms of accuracy of obtained information as well as in terms of speed of dealing with requests for services. Finally, the availability of supporting facilities offered by the company is rated as just acceptable by most of the respondents.

Table 4: Respondents' Assessment of Criteria Describing Service Level Offered by ACHC

Level of Service Criteria	Assessment of Respondents* (Mode)
Ease of Dealing with Company	Very Good (33%)
Accuracy of Obtained Information	Good (40%)
Punctuality of Services Offered	Very Good (40%)
Safety of Container Handling	Excellent (51%)
Speed of Dealing with Requests for Services	Good (44%)
Availability of Supporting Facilities	Poor (40%)

(\*) Assessment Scale: Poor – Acceptable – Good – Very Good – Excellent  
45 Respondents of which 35 are customers' brokers and 10 are navigation lines' agents

Several issues were also raised by the respondents. The first is concerned with the lengthy perceived duration from the time a request is made to bring out containers from ACHC storage yards to locations where these can be examined and inspected by customs personnel. According to respondents, the reason for this is the lack of

sufficient handling equipment and sometimes the inadequate condition of existing handling equipment. The second raised complaint was concerned with the perceived difficult customs regulations and various inspection procedures and their lengthy duration. Two other issues were raised related to customs and inspections, namely, the high-perceived dues that have to be paid to several government bodies as well as the excessive sample sizes taken for inspection. Navigation line agents had several other specific complaints, namely the bureaucracy encountered in releasing special dimension containers and the lack of sufficient necessary equipment to handle such containers. In addition, several of these agents stated that the rate of container handling between anchored ships and ACHC quay is perceived as being low.

## **6. IMPROVING OPERATIONS OF ALEXANDRIA CONTAINER HANDLING COMPANY: THE WAY FORWARD**

It seems clear from the above analysis that several factors contribute to the lengthy durations and delays encountered by customers to clear their containers through ACHC. Some of these are related to the bureaucracy and lengthy customs and inspection procedures, while others are related to ACHC capacity constraints and slow speed of dealing with customers' requests for container handling services. The company should be aiming at reducing the time durations consumed in container handling through ensuring the availability of more, technologically up to date handling equipment i.e. modernising and upgrading its equipment. Additionally, the company should be also contemplating on introducing new services such as offering transport services of containers or cargo from the port to customers' warehouses (i.e. ship to door handling and transport of containers and/or cargo). Another new service that can be introduced is the ability to repair containers.

The questionnaire demonstrated the lack of supporting facilities for container handling. In this context, it is thought that the creation of competitive advantage through offering excellent supporting and new services would attract more navigation lines and hence container handling activities. Respondents made several suggestions for the type of required supporting facilities. These include availability of appropriate rest areas for customers and brokers, as well as availability of business centers equipped with communication facilities including phones, faxes and Internet services. These centers should be capable of providing customers with accurate and punctual information as well as guiding them to the container handling process and the sequence of required steps. Such center should be based on a computerised information network that is updated by all company's departments involved in the process. It is thought that all of the various company's departments dealing with customers should be integrated in one location to facilitate and ease the process of dealing with customers. Another important supporting service is providing adequate parking spaces and a service station for customers' vehicles.

Government agencies and authorities responsible for customs inspection as well as other types of inspections ought to be integrated in one single agency so as to reduce the time durations and costs for performing these activities. In this context, the research advocates following the International Convention on the Harmonization of Frontier Controls of Goods that has been negotiated in 1982 within the United Nations. This convention aims at harmonizing activities of various control services. This entails a reduction in the requirements for completing formalities, reduction in number and duration of all types of controls, be it for health reasons, or for quality

inspections and applies to all goods being imported, exported or in transit. This should be accompanied by a reduction in sample sizes in case samples are required for lab tests and inspection.

A recommendation by AlHabr (1999) is for ESCWA ports, including Alexandria port, to consider introduction of efficiency gains by encouraging the involvement of the private sector in the business of freight forwarding, stevedoring, container handling, ships' repair, etc. It is also recommended to examine and update pricing of port services on a continuous basis so as to be in line with international prices as well as to be competitive compared to service pricing in other competing ports in the Middle East. The most recent study tackling this issue was conducted in 1997, see CRCMS (1997). A method reported by Veras and Diaz (1999) was developed to attain optimal pricing for service and space allocation in container ports. Last, but not least, advanced technology for container inspection without opening containers should be adopted.

Like many government agencies in Egypt, the organisational structure of Alexandria port possesses a lot of ills and weaknesses in terms of being complex, rigid, static, unclear, constituting several managerial layers, where activities are duplicated and contradicted. The possibility and potentiality of restructuring or privatising the operation of Alexandria port ought to be examined. Currently, it is thought that Egyptian ports should be structured as independent, self-sufficient business oriented corporations, see JICA (1999).

## **7. CONCLUSION**

The main aim of this research was to assess the services offered by ACHC in an effort to suggest a package of improvements. The assessment followed a unique line of analysis. It started by examining and comparing statistics of main ports in Egypt as well as computing and comparing performance indicators of main container handling companies in Egypt. This was followed by developing two logistics chains, the first represents the process involved in handling imported containers while the second is the chain concerned with handling exported containers. Based on these chains, stakeholders involved in the business of container handling in Egypt were identified. Also, based on the logistics chain analysis, a questionnaire was developed and conducted with two types of ACHC customers, namely navigation lines and customers' brokers. The main purpose of the questionnaire was to elicit the perception of ACHC customers with regards to the services offered by the company as well as by other port authorities. Finally, a set of improvement policies and measures were discussed to present a basis for overcoming identified shortfalls as well as for enhancing operation and quality of delivered services.

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